

WHAT IS CLAIMED:

1 *Sub*
2 *Q1* In a sending station operable in a communication system to send data upon a
3 communication channel susceptible to fading, an improvement of apparatus for placing the data
4 in a form to facilitate communication thereof upon the communication channel, said apparatus
5 comprising:

6 an encoder coupled to receive first values representative of the data to be
7 communicated upon the communication channel, said encoder for encoding the first value
8 representative of the data into encoded form, the encoded form forming a codeword of a
9 recursive, systematic space-time code, and the codeword complying with an equal eigenvalue
10 criterion .

11 2. The apparatus of claim 1 wherein said encoder comprises a first systematic
12 recursive structure including a feedback path formed therein.

13 3. The apparatus of claim 1 wherein the codeword of the systematic space-time code,
14 into which said encoder encodes the first values representative of the data, includes at least a
15 systematic part, and wherein the systematic part is formed of untransformed values of the first
16 values representative of the data.

17 4. The apparatus of claim 3 wherein the codeword of the systematic space-time code,
18 into which said encoder encodes the first values representative of the data, is further formed of

1 parity values, the parity values derived from the first values representative of the data.

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1 coupled to receive at least one of the first values, said coset selecting coder for producing coset
2 addressing values.

1 9. The apparatus of claim 8 wherein at least one part of the coset addressing values
2 produced by said coset selecting coder comprises a parity value.

1 10. The apparatus of claim 8 wherein at least one part of the coset addressing values
2 produced by said coset selecting coder comprises a non-derived value.

1 11. The apparatus of claim 8 wherein said encoder further comprises a signal entity
2 selector coupled to said coset selecting coder, said signal entity selector for selecting a
3 multidimensional constellation entity related to the coset addressing values produced by said
4 coset selecting coder, a multi-dimensional constellation entity forming at least part of the
5 codeword of the systematic recursive space-time code.

1 12. The apparatus of claim 11 wherein said signal entity selector generates a binary
2 representation of the multi-dimensional constellation entity.

1 13. The apparatus of claim 11 wherein said signal entity selector is further coupled to
2 receive at least one of the first values and wherein the multi-dimensional constellation entity
3 selected at said signal entity selector is further related to the at least one of the first values.

1 14. The apparatus of claim 13 wherein the at least one of the first values to which said
2 first signal entity selector is coupled to receive comprises a systematic part.

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4 15. In a method of communicating in a communication system having a sending
5 station operable to send data upon a communication channel susceptible to fading, an
improvement of a method for placing the data in a form to facilitate communication thereof upon
the communication channel, said method comprising:

8 applying values representative of the data to be communicated upon the
9 communication channel to an encoder;

10 encoding the values into encoded form, the encoded form forming a codeword of
11 a recursive, systematic space-time code, and the codeword complying with an equal eigenvalue
12 criterion.

1 16. The method of claim 15 wherein the codeword of the recursive, systematic space-
2 time code formed during said operation of encoding comprises both untransformed values
3 representative of the data to be communicated upon the communication channel and parity
4 values, the parity values derived from the values representative of the data.

1 17. The method of claim 15 wherein said operation of encoding comprises the
2 operations of:

